Cesarean Section and the Failed Epidural: What Next?

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OBJECTIVES

1. To understand why a functioning epidural catheter for labor becomes nonfunctional for cesarean section
2. Discuss whether epidural catheters become dislodged during labor
3. To understand the etiology of one-sided blocks
4. Spinal anesthesia following failed epidural anesthesia - possible consequences

STEM CASE - KEY QUESTIONS

A 24-year old parturient in active labor received a lumbar epidural analgesia at 3 cm cervical dilation. The patient received 15 cc 0.1% ropivacaine with fentanyl 2 ug/cc and then was begun on a continuous infusion of this mixture at 10 cc/hr. Four hours later, she became uncomfortable requiring a bolus of 10 cc 0.2% ropivacaine. You suspect that the epidural catheter may be dysfunctional but the patient did become comfortable with the bolus . Twenty hours later, the patient required cesarean section for failure to progress. She had recieved 2 additional boluses of local anesthetic to maintain her comfort during the labor. In the operating room, the patient received 20 cc 1.5% lidocaine with epinephrine 1:200,000 through her epidural catheter. Her sensory level was T6 but patchy. She had some leg weakness but was still able to move her legs 20 minutes later.

1. What would you do next? Would you continue to administer local anesthetic through the epidural catheter?

2. Why is there an increase in the use of epidural analgesia for labor?

3. If an epidural catheter worked for labor, won't it work for cesarean delivery?

4. My previously functional epidural catheter is no longer functional. Did it become dislodged?

5. What is the cause of one-sided blocks?

6. If the epidural catheter provides inadequate anesthesia, what would you do next?

7. Is it safe to do a spinal anesthetic following inadequate epidural anesthesia?

PROBLEM BASED LEARNING DISCUSSION

1. Why is there an increase in the use of epidural analgesia for labor?

When surveying institutions to understand who was performing obstetric anesthesia, it was discovered that the use of epidural analgesia for labor more than doubled when comparing 1981 versus 1992. Several reasons account for this increase including decreased risk of mortality, improved technique, patient expectations, and the understanding that epidural analgesia does not

interfere with the progress of labor. As such, it is not uncommon for a parturient to require cesarean section who has an epidural in place.

2. Why the increase in cesarean section?

Cesarean section is the most common hospital-based operative procedure in the United States with an incidence of about 22%. The increase has been attributed to the liberalization of indications for nonreassuring fetal heart rate, cephalopelvic disproportion, breech, as well as elective repeat cesarean delivery.

3. Can this epidural that was placed for labor be used to provide anesthesia for cesarean section?

Only in 1973 was it shown that labor epidural anesthesia could be extended for cesarean section. Anesthesiologists were worried that epidural anesthesia would be inadequate for major intraabdominal surgery in an awake, unmedicated parturient. Using an epidural block for cesarean section is a stringent test of the technique because deficiencies in analagesia cannot be covered by the free use of depressant drugs. The first study examining epidural anesthesia for cesarean section used 14 to 16 ml of local anesthesia, usually 2% lidocaine with epinephrine, 1:200,000. In 182 cases, 170 patients felt no discomfort and only 12 required supplemental sedation. The biggest problem was the surgeon's ability to tolerate an awake patient who at times coughed or vomited.

4. If an epidural catheter worked for labor, won't it work for cesarean delivery?

In the majority of cases, if the epidural catheter functioned well and provided labor analgesia, it should provide adequate anesthesia for surgery. If it functioned well for labor and now the patient complains of pain during her cesarean section, it could be an inadequate level. The recommended sensory blockade for cesarean section varies from T8 to T2. Although some of this dissimilarity is explained by operative technique (exteriorizing the uterus for repair requires a higher level of block), the range is still great. Pain sensations from pelvic organs enter the spinal cord at T10 to L1, but more extensive blockade is required for cesarean section because some pelvic nerves accompany sympathetic fibers through the various intra-abdominal plexi, and the greater splanchnic nerve, to reach the spinal cord as high as T4. Visceral pain also arises from other intra-abdominal structures such as the peritoneum, which is innervated by sensory afferents that enter the spinal cord as far cephalad as T1. The lower extent of sensory blockade is also important for patient comfort. Another cause of visceral pain is incomplete block of the large nerve roots of L5 to S2. Blocking of these roots is required to prevent pain from traction on the uterosacral ligaments or bladder. I feel that the greatest reason it is not working is that it probably never worked. In a study of 596 women who received epidural analgesia, one of the greatest risks for inadequate pain relief during delivery was inadequate analgesic efficacy of the first dose. In an abstract from SOAP 2002, higher patient weights and the need for >2 top-ups while using a PCEA were found to significant predictors of failure of labor epidural for providing adequate anesthesia for cesarean section.

4. My previously functioning catheter is no longer functional. Did it become dislodged?

Crosby studied epidural catheter migration during labor. Catheter movement was assessed in 211 parturients. Of these epidural catheters, 54% migrated during labor (80 migrated out and 34 migrated in; of these 26 moved greater than 2 cm). Hamilton et al noted changes in location of the catheter markings at the skin during placement. These changes in markings were related to patient position changes. Catheters appeared to be drawn inward with position change from the sitting flexed to the sitting upright. These authors recommend that patients assume the sitting upright position before securing the catheter to the skin.

5. What is the cause of one-sided blocks?

There are two interesting studies, both appearing in 1996. Asato and Goto performed epidurography in seven patients who developed unilateral blocks. In four patients, the epidural catheter tip was located in the anterior epidural space and in three patients, in the transforaminal passage. Collier did a similar study of 18 cases of unsatisfactory anesthesia. The most typical reason for failed anesthesia was tranforaminal escape. The second most common reason was an obstructive barrier in the epidural space. Whether this barrier represents the dorsomedian connective tissue band, the dorsal middle septum, a distended midline pedicle, or simply epidural fat is still a much debated topic.

6. My epidural catheter is providing inadequate anesthesia. What should I do next?

The most important step is to recognize an inadequate block. It is not prudent to persist with a nonfunctioning epidural catheter by providing more local anesthetic or supplemental sedation. The second step is to assess the fetal heart rate as to the urgency of the case. Is there time to perform a regional anesthetic or is general anesthesia indicated? Can I do a rapid sequence induction and successfully intubate the patient or do I need to do a topicalized fiberoptic intubation? It is important to precede quickly but cautiously.

7. Should I repeat the epidural, perform a spinal, or do something else if my epidural anesthetic is inadequate?

When confronted with this situation, it is helpful to remember the mnemonic: RACE. R is for RECOGNIZE the problem; A is for ASSESS the fetal heart rate; C is for CONSIDER your options; and E is for EVALUATE the airway.

Repeating the epidural is certainly an option although there is the concern that the problem won't be corrected, local anesthetic toxicity, and time involved. Performing a spinal anesthetic after a failed epidural is a debatable topic (as proven by the debate at the Society of Obstetric Anesthesia and Perinatology Meeting 2002). The argument for spinal anesthesia is the lack of anatomic abnormalities that would prevent bilateral anesthesia and decreased risk of local anesthetic toxicity. The concern with spinal anesthesia is the development of a high block. The postulated mechanisms of a high block are 1) compression of the intrathecal space by the epidural solution and 2) transfer of epidural solution intrathecally.

Author	Pt Ht (cm)	Pt Wt (kg)	Epidural Injection	Intrathecal Injection	Outcome
Dell	158	78	45 cc 0.5%B	12.5 mgB	high level, intubated
Adams	no mention	no mention	61 cases	no mention	No high block
Stone	153	54	33 cc0.5%B	8 mgB	Intubated
Goldstein	162	96	?	40 mgL	Intubated
	167	67	20+cc0.25%B	30 mgL	C5-6 level
Waters			21 patients		4 high level, 1 intubation
Furst	175	78	34 cc2%L	12 mgB	intubated
	165	71	20+cc2%L	9 mgB	High level
Mets	155	98	33cc0.5%B	11.25 mgB	Intubated
Beck	150	52.6	20cc0.5%B	10 mgB	Intubated
	150	69.5	15cc0.5%B	12.5 mgB	Intubated

B-Bupivacaine, L-Lidocaine

8. So, what is the take home message?

In the literature, there are 18 cases of high sensory level following the administration of spinal anesthesia for failed epidural anesthesia. Of the seven high sensory levels where amounts of drug were presented, six had received greater than 20 ml of anesthetic. If 20 ml of local anesthetic fails to achieve a satisfactory level, it is unlikely that additional local anesthetic will help the situation. There are 102 cases of successful spinal anesthetics following failed epidural anesthesia. I would not hesitate to perform a spinal anesthetic in a parturient who did not achieve satisfactory anesthesia after 20 ml 1.5% lidocaine. I would be aware that a high level is possible. Continuous spinal anesthesia and general anesthesia are other options and are dependent upon the clinical situation.

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LEARNING SUMMARY

The following key items will be discussed: 1) reasons a previously functioning epidural catheter fails to provide adequate anesthesia for cesaren section, 2) epidural catheters and migration, 3) etiology of one-sided blocks, 4) implications of spinal anesthesia following failed epidural anesthesia.